p. 344, Ledebur says :—" With the amount of the added ore, the difficulty increases of preserving a durable furnace lining. , . . Only a part of their iron content is reduced from the ores, in all processes for the production of soft iroh from ores; the other part goes into the slag; finally also the productive capacity of the furnace diminishes whilst the fuel consumption and the wages increase."

H. H. Campbell investigates the problem exhaustively and says (p. 14):—"Sometimes the slag has a sufficient supply of oxide of iron and needs no more. In this case, when ore is added, all the oxygen goes to the carbon of the bath so that there are three atoms of oxygen calling for three atoms of carbon. This leaves the iron alone in its metallic state and is instantly dissolved in the bath and the weight of the charge is just increased by so much. The chemical symbol expressing this is as follows :—$Fe_2O_3+8C=2Fe+3CO$. Generally it will happen that the truth lies between these two conditions; that the slag keeps part of the oxide and the rest is reduced, part of the oxygen uniting with the carbon and part of the iron being dissolved in the bath, the remainder of the oxide of iron entering the slag."

But how much is this balance which must remain in the slag ? From the fact that the ferrous oxide is the active agent in the slag, which again cannot otherwise act on the reducing agents in the iron, as, if it does, it is itself thereby re-transformed, that further, thanks to the conditions naturally existing in the open-hearth process, owing to which iron oxide can be reduced to metal from the slag down to the point that the iron content of the latter has reached 10 per cent., it follows that if this necessary amount of 10 per cent, of iron is present in the slag, additions of iron are reduced and indeed must be completely reduced, as their amounts correspond to the amounts of the reducing agents present. The reduction then can only be incomplete if also the necessary ferrous oxide content for the existence of the slag should be covered by the ore, or if the addition of ore is greater than corresponds to the amount of reducing agents present, or, lastly, if the ore contains impurities like silica, which create